Printed Pages:03 **Sub Code:KEE201**

Paper Id: 238169 **Roll No.** | | | | | | | | | | |

B. TECH.
(SEM II) THEORY EXAMINATION 2022-23
BASIC ELECTRICAL ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

(a) Define Active and Passive elements.

(b) What is the limitation of superposition theorem?

(c) What are the disadvantages of low power factor?

(d) A series circuit with R = 10Ω, L =10mH, and C =100pF is connected across 180V variable frequency source. Calculate the value of current at resonance.

(e) A coil has 400 turns, find the induced voltage in it, if the flux changes from 0.2mWb to 1mWb in 0.2 seconds?

(f) What is the condition of the maximum efficiency of transformer?

(g) What is the relation between supply frequency, number of poles, and synchronous speed?

(h) What is the function of slip rings in 3-Φ induction motor?

(i) What are the differences between primary and secondary batteries?

(j) Write full form of (i) MCCB, (ii) ELCB, (iii) SFU, (iv) MCB

SECTION B

2. Attempt any *three* of the following: 10x3=30

(a) Derive an expression for the conversion of star to delta and delta to star transformation.

(b) A balanced star-connected load of (3+j4) Ω/phase is connected to a 3-ϕ, 400 V supply. Calculate the line current, power factor, active and reactive power drawn from the supply.

(c) A 40 kVA transformer has core loss of 500 W and full-load copper loss of 900 W. If the power factor of the load is 0.9 (lagging) then calculate (i) the efficiency of transformer at full load.(ii) Half load efficiency at 0.9 pf (iii) Max efficiency at 0.9 pf.

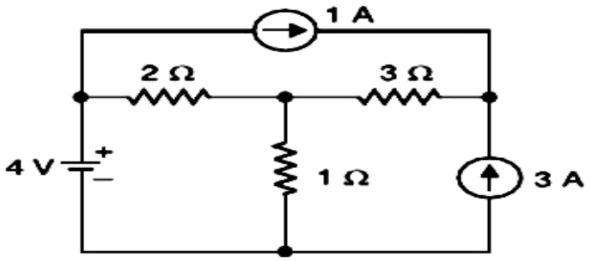
(d) Why 1- Φ induction motor is not self-starting? What are the different methods of starting? Explain any one of them.

(e) Explain the importance of earthing. Also explain the different methods of earthing with neat and labelled diagram.

SECTION C

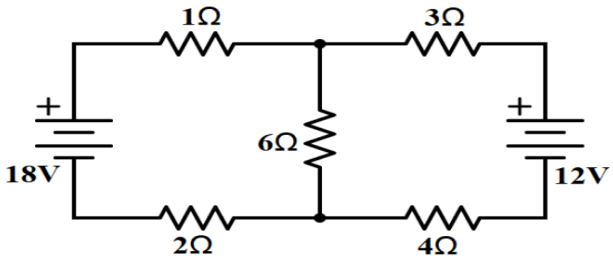
3. Attempt any *one* part of the following: 10x1=10

(a) Calculate the current across the 1Ω resistor in the following circuit using the thevenin's theorem.



(b) Calculate the current across 6Ω resistor in the following circuit using:

(i) Mesh Analysis
(ii) Nodal Analysis



4. Attempt any *one* part of the following: 10x1=10

(a) Derive an expression of bandwidth, upper and lower half power frequency of a series resonating circuit.

(b) A 10 mH coil is connected in series with a loss free capacitor to a variable frequency source of 30 V. The current in the circuit has a maximum value of 0.3 A at a frequency of 100 kHz. Calculate (i) the value of capacitance to produce resonance, (ii) Q-factor of the coil, (iii) Half power frequencies.

5. Attempt any *one* part of the following: 10x1=10

(a) Draw the phasor diagram of ideal and practical transformer at no-load conditions.

(b) Derive an expression of EMF equation of transformer. A 25 KVA transformer has 250 turns on primary and 40 turns on secondary. The primary is supplied with 1500 V, 50 Hz alternating supply. Calculate (i) The rated primary and secondary currents, (ii) maximum flux in the core.

6. Attempt any *one* part of the following: 10x1=10

(a) (i) Draw and explain the Torque-slip characteristics of 3- Φ induction motor.
(ii) A 3- Φ, 50Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine (i) The speed of rotor with respect to stator, (ii) the frequency of rotor current, (iii) the speed of rotor magnetic field with respect to the stator.

(b) (i) What is the function of commutator and brushes in DC generator?
(ii) Calculate the EMF generated by 4 pole wave wound DC generator having 65 slots with 12 conductor per slot when driven at 1200 rpm. The flux per pole is 0.02 wb.

7. Attempt any *one* part of the following: 10x1=10

(a) Explain the following with neat and labelled diagram:
(i) Earth Leakage Circuit Breaker
(ii) Miniature Circuit Breaker

(b) A battery has taken a charging current of 5.2A for 24 Hrs. at a mean charging voltage of 2.25V. While discharging it gave a current of 4.5A for 24 Hrs. at an average voltage of 1.85V. Calculate the ampere-hour and watt-hour efficiencies of the battery.